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PLANETARY PHENOMENA FOR JULY AND AUGUST, 1917.

By MALCOLM MCNEILL.

PHASES OF THE MOON, PACIFIC TIME.

Full Moon....	July	4,	$1^h\ 40^m$ P. M.	Full Moon...	August	2,	$9^h\ 11^m$ P. M.
Last Quarter..	"	11,	4 12 A. M.	East Quarter.	"	9,	11 56 A. M.
New Moon ...	"	18,	7 0 P. M.	New Moon ..	"	17,	10 21 A. M.
First Quarter..	"	26,	10 40 P. M.	First Quarter.	"	25,	11 8 A. M.

The fourth eclipse of the year occurs on July 4 and is *a total eclipse of the Moon*. It will not be visible in the United States, the region of visibility being confined to the Eastern Hemisphere and the southern part of the Western. The principal conditions of the eclipse are as follows, Pacific Time:

Moon enters shadow......................	July 4,	$11^h\ 52^m$ A. M.
Total eclipse begins......................	" 4,	12 51 P. M.
Middle of the eclipse......................	" 4,	1 39 P. M.
Total eclipse ends......................	" 4,	2 27 P. M.
Moon leaves shadow......................	" 4,	3 25 P. M.

The fifth eclipse is *a partial eclipse of the Sun* on July 18. It will be visible only in the far southern regions and the maximum obscuration will be less than one-tenth of the Sun's diameter.

The Earth is in aphelion July 3 at noon, Pacific Time.

Mercury is a morning star at the beginning of July, rising not quite an hour before sunrise; so it will not be an easy object for naked eye observation. Its distance from the Sun diminishes very rapidly, superior conjunction occurring on July 12. The planet then becomes an evening star and remains such until September 18. Greatest east elongation, 27° 23′, is reached on August 22, but the planet is then about 11° south of the Sun, so that it sets only a little more than an hour after sunset. It may, however, be seen in the evening twilight if the air is very clear. This greatest elongation, 27° 33′, is nearly the maximum possible since it occurs less than three days after the planet is in aphelion. *Mercury* is in conjunction with *Saturn* on July 18, but both planets are too near the Sun for naked eye view on that date.

Venus is an evening star slowly increasing its distance from the Sun, about 12° during the two months setting $1^h\ 12^m$ after sunset on July 1, and $1^h\ 21^m$ after on August 31. It is bright enough to be seen on any clear evening. On July 15 it attains its greatest heliocentric latitude, that is, its most northerly position as seen from the Sun. On July 4 it passes conjunction with *Saturn*, the latter being about 1° south, and two days later it is in conjunction with *Neptune*, the latter being not quite 2° south. On July 27 it passes about 1° 30′ north of the first magnitude star *Regulus*, *a Leonis*.

Mars rises at about $2^h\ 45^m$ A. M. on July 1, and at about $1^h\ 40^m$ on August 31; it is therefore getting far enough away from the Sun to enable it to be easily seen in the early morning hours. Its distance from the Sun increases about 15° during the two months. Its motion among the stars is about 45° nearly due eastward, from a position north and east of *Aldebaran*, the prinicpal star in *Taurus*, to a point a few degrees south of *Castor* and *Pollux*, the brighest stars in *Gemini*. Its actual distance from the Earth in miles has begun to grow smaller, but it is still not enough to cause any marked increase in brightness.

Jupiter rises shortly after 2 A. M. on July 1, and at about $10^h\ 45^m$ P. M. on August 31. During the two months it moves about 10° eastward and 2° northward, the eastward motion diminishing slowly and coming to a stop at the end of September. It is in the constellation *Taurus* and on August 24 it is in conjunction with *Aldebaran*, the brightest star of the constellation, the planet then being about 4° north of the star.

Saturn is an evening star on July 1 setting rather less than an hour and one half after sunset; and therefore is near the limit for naked eye visibility. The more rapid eastward motion of the Sun causes a rapid approach of the two bodies, so that conjunction is reached on July 27 and the planet becomes a morning star. The relative motions of Sun and planet after conjunction cause a rapid separation with the planet drifting more and more to the north of the Sun, so that by the end of August *Saturn* rises at about 3 A. M., two and one half hours before sunrise. By the middle of August the interval is large enough for naked eye visibility of the planet in the morning twilight. On July 30, only three days after conjunction with the Sun, *Saturn* is in conjunction with *Neptune*, but on this date both bodies are too near the Sun for even a telescopic view.

Uranus is in good position for evening observation coming to opposition with the Sun on August 14, and is above the horizon most of the night during the two months. It is still in the constellation *Capricorn* and during the two months moves about 2° westward and not quite 1° southward. It may be found comparatively easily by its proximity to the third magnitude star *δ Capricorni* and the fourth magnitude *γ Capricorni.* Its motion is about 2° westward and 20′ southward during the two months. On July 11 it is about 2° due north of *δ Capricorni* and on August 27 it is about 2° north of *γ Capricorni.* The two stars are distant from each other about 2°.

Neptune is very near *Saturn* and passes conjunction with the Sun on the same day, August 27.

Elements and Ephemeris of the Asteroid Iris.

The asteroid *Iris* will be in opposition on July 21, 1917, and will be nearest the Earth on July 30. This asteroid is of special interest in that its light varies in much the same way as that of *Eros*, *Eunomia*, and several others.

Elements.

E = 1917 July 17.50 G. M. T.
M = 28°2 2′1 45.″01
ω = 14°1 3′1 26.″89
Ω = 26°0 3′3 44.″30
i = 5° 2′8 1.″20
Log e = 9.363335
Log a = 0.377712
μ = 962.″58281

Ephemeris.

1917	α	δ	Log r	Log Δ
July 1	20^h 18^m 26^s	−14° 33′ 31″	0.38654	0.16818
July 5	20 15 11	−14 31 27	0.38472	0.15978
July 9	20 11 36	−14 30 42	0.38290	0.15238
July 13	20 7 43	−14 31 20	0.38106	0.14610
July 17	20 3 38	−14 33 2	0.37922	0.14099
July 21	19 59 24	−14 35 47	0.37734	0.13714
July 25	19 55 27	−14 39 19	0.37546	0.13459
July 29	19 50 53	−14 43 28	0.37356	0.13341
Aug. 2	19 46 45	−14 48 15	0.37164	0.13342
Aug. 6	19 42 50	−14 53 21	0.36974	0.13479

Frank E. Seagrave.